

Claims

1. A device for sealing a puncture extending through tissue proximal to an interior vessel surface, the device comprising:

a first disk having a self-expanding frame that forms a plurality of petals; and

a proximal element coupled to the first disk,

wherein the device has a retracted delivery configuration adapted for delivery to the puncture, and a deployed configuration in which the first disk is adapted to engage and substantially conform to the interior vessel surface, and the proximal element is configured to engage the tissue.

2. The device of claim 1, wherein the first disk is configured to be released from engagement with the interior vessel surface.

3. The device of claim 1 or 2, wherein the first disk is configured to be releasably coupled to the proximal element.

4. The device of claim 1, 2 or 3, wherein the proximal element comprises a second disk.

5. The device of claim 4, wherein the first disk is attached to a nut and the second disk is attached to a bolt, the nut configured to be releasably coupled to the bolt.

6. The device of claim 1, 2, 3, 4 or 5, further comprising at least one delivery shaft configured to facilitate coupling of the first disk to the proximal element.

7. The device of any one of claims 1 to 6, further comprising at least one delivery element constrained to translate a maximum distal depth.

8. The device of claim 6, wherein the at least one delivery shaft is configured to facilitate decoupling of the first disk from the proximal element.

9. The device of any one of claims 1 to 8, wherein the proximal element comprises a spring.

10. The device of any one of claims 1 to 9, wherein one or both of the first disk and the proximal element comprises barbs, hooks, sharp edges, or roughened surfaces.

11. The device of any one of claims 1 to 10, further comprising a membrane encasing at least the self-expanding frame of the first disk.

12. The device of any one of claims 1 to 11, further comprising a coagulant-enhancing agent disposed on one or both of the first disk and the proximal element.

13. The device of any one of claims 1 to 12, wherein the device comprises a biodegradable material.

14. A device for sealing a puncture extending through tissue proximal to an interior vessel surface, the device comprising:

a first self-expanding disk and a second self-expanding disk,

wherein the device is configured to be released from engagement with the interior vessel

surface after deployment of the device, thereby permitting the device to be repositioned.

15. The device of claim 14, wherein the second self-expanding disk substantially conforms to the interior vessel surface.

16. The device of claim 14 or 15, further comprising a membrane encasing at least the second self-expanding disk.

17. The device of claim 14, 15 or 16, further comprising a coagulant-enhancing agent disposed on one or both of the first and second self-expanding disks.

18. The device of claim 14, 15, 16 or 17, wherein the first self-expanding disk is configured to be releasably coupled to the second self-expanding disk.

19. The device of claim 14, 15, 16, 17 or 18, further comprising a nut and a bolt, wherein the first self-expanding disk is attached to the nut and the second self-expanding disk is attached to the bolt, the nut configured to be releasably coupled to the bolt.

20. The device of any one of claims 14 to 19, further comprising at least one delivery shaft configured to facilitate coupling of the first self-expanding disk to the second self-expanding disk.

21. The device of claim 20, wherein the at least one delivery shaft is configured to facilitate

decoupling of the first self-expanding disk from the second self-expanding disk.

22. The device of any one of claims 14 to 21, wherein the first self-expanding disk comprises a frame and the second self-expanding disk comprises a frame.

23. The device of claim 22, wherein the frames of the first and second disks form a plurality of petals.

24. The device of any one of claims 14 to 23, wherein the device comprises a biodegradable material.

25. A device for sealing a puncture extending through tissue proximal to an interior vessel surface, the device comprising:

a nut coupled to a bolt,

wherein the device is configured to be releasably engaged to the interior vessel surface.

26. The device of claim 25, wherein the bolt is configured to substantially conform to the interior vessel surface.

27. The device of claim 25 or 26, wherein the nut is configured to be releasably coupled to the bolt.

28. The device of claim 25, 26 or 27, wherein the nut comprises a first self-expanding disk and the bolt comprises a second self-expanding disk.

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29. The device of claim 25, 26, 27 or 28, wherein the device is biodegradable.

30. A device for sealing a puncture extending through tissue proximal to an interior vessel surface, the device comprising:

a first disk having a self-expanding frame that forms a plurality of petals; and
a proximal element coupled to the first disk,

wherein at least part of the device is biodegradable.

31. The device of claim 30, wherein the device has a retracted delivery configuration adapted for delivery to the puncture, and a deployed configuration in which the first disk is adapted to engage and substantially conform to the interior vessel surface, and the proximal element is configured to engage the tissue.

32. The device of claim 30 or 31, wherein the device is configured to be releasably engaged to the interior vessel surface.

33. The device of claim 30, 31 or 32, wherein the first disk is configured to be releasably coupled to the proximal element.

34. The device of claim 30, 31, 32 or 33, wherein the proximal element comprises a second disk.

35. The device of claim 34, wherein the first disk is attached to a nut and the second disk is

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attached to a bolt, the nut configured to be releasably coupled to the bolt.

36. The device of any one of claims 30 to 35, wherein the proximal element comprises a spring.

37. The device of any one of claims 30 to 36, wherein one or both of the first disk and the proximal element comprises barbs, hooks, sharp edges, or roughened surfaces.

38. The device of any one of claims 30 to 37, further comprising a minimally invasive delivery element configured to deliver the first disk and the proximal element.

39. The device of any one of claims 30 to 38, further comprising at least one delivery element constrained to translate a maximum distal depth.

40. A device for sealing a puncture extending through tissue proximal to an interior vessel surface, the device comprising:

a first disk having a self-expanding frame that forms a plurality of petals;

a proximal element coupled to the first disk; and

a minimally invasive delivery apparatus comprising first and second delivery elements configured to at least selectively limit distal translation of the first delivery element with respect to the second delivery element so that only the first disk is extended out of the minimally invasive delivery apparatus.